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General Articles.

GRADING AND DEFINITION OF MILK.

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The terms "grading" and "definition," as applied to milk are complementary to one another. Grading implies the grouping or classification of milk into a series of grades or classes, the characters and qualities of each class being clearly defined.

The fact that material variations occur in respect of the nutrient properties and the hygienic qualities of milk as offered for sale is steadily becoming more clearly appreciated by the general mass of consumers. The consistently uniform prices at which milk has been sold, irrespective of quality, have contributed in a considerable measure to the tardy realisation of the extent and significance of these variations. Dissemination of knowledge on the subject has, however, given rise to a demand —relatively small at the moment—but which is undoubtedly growing, that the general standard of the quality of milk should be improved, and that it should be sold at a price which bears some relation to its qualities. If variations in the quality of milk (within the limits of marketability) were obvious, matters would quickly remedy themselves, but the consumer does not possess the means of determining their existence either at the time of purchase or afterwards. There is thus justification for the demand that guidance should be provided by means of a system of grading or classifying milk in order that the consumer may have a reasonable measure of assurance that the article he purchases will comply with definite standards of quality.

A limited demand for milk of superior quality existed for a considerable time before milk became a controlled article of food, and an effort was made to meet this demand by the more enterprising producers and middlemen, who placed on the market milk classified under various names implying superiority of quality. Without doubt, superiority was justly claimed in many instances, but it is also without doubt that in certain cases no justification for the claim existed, and a position was created which operated prejudicially on the interests of the consumer as well as of the honest dealer. The case quoted in the final report of the Committee on the Production and Distribution of Milk will suffice to illustrate the position. The milk to which reference is made was sold as "Certified Milk in Glass Bottles. Direct from Farm to Consumer." It was heavily polluted, and contained living virulent tubercle bacilli. Its superiority apparently lay in its potentialities for harm. Such cases make it clear that public confidence can only be gained by restricting the use of terms, which are descriptive of quality, to milk which has been produced and handled under specified conditions, and which carries an official guarantee of superiority in definitely specified respects.

It is advisable at this stage to consider the present and possible future position in respect of the official grading of milk. Official grading was introduced, in a limited measure, by the Ministry of Food during the period of milk control, by the issue of licences to producers permitting the sale at enhanced prices of milk which fulfilled specified conditions. This principle was modified and extended by the Ministry in March of the present year. A Bill to amend the Milk and Dairies (Consolidation) Act, 1915, is at present before Parliament. It seeks power to apply the principle of grading to all classes of milk. This power, if granted by Parliament, will be exercisable at the option of the Ministry of Health by the issue of an Order prescribing the conditions subject to which milk may be sold under specified designations or declarations. A Bill to amend the Milk and Dairies (Scotland) Act, 1914, is in course of preparation, and it may safely be assumed that the amendments will bear a close resemblance to those contained in the English Bill.

The following points appear to indicate that the early introduction of an official system of grading is seriously contemplated by the Central Health Authorities :—

1. The application of the principal Act has been deferred pending the passage of the Amending Bill, one of the main provisions of which is the power to grade milk.
2. The Amending Bill appears to be the sequel of the Report of the Astor Committee, in which the official grading of milk is strongly advocated.
3. The ground has been prepared by the grading of milk on a voluntary basis by the Ministry of Food.

It is impossible, however, to estimate the extent of the intention of the Central Health Authorities to apply the principle of grading milk. In addition to the option already referred to in respect of the issue of an Order, the Ministry of Health may exercise a further option in that the Order may "require" or may merely "authorise" the use of special designations in connection with the sale of milk.

It would appear reasonable to suppose that the official grading of milk, if definitely decided upon, would be a matter rather of growth and development than of immediate general application. The official certification of the higher and better qualities, which are likely always to constitute a relatively small proportion of the total supplies, would be undertaken in the first instance, and when sufficient experience had accumulated, the principle could be extended gradually to the other classes, provided the value of the results achieved justified the cost of securing them. Under any circumstances it would not be possible to make any system of grading which might be devised generally operative immediately after its introduction—a lapse of time would be essential during which the information necessary to permit the grouping of milk into the different categories could be accumulated. A single test would not be a fair criterion of the average qualities of milk derived from any source, and would neither justify inclusion in a particular category nor exclusion from it. A fair and just estimate could only be formed by a series of tests spread over a period of time. Nor could any system of grading guarantee that a particular milk would conform at all times to a definitely specified standard. Only by check tests repeated at relatively short intervals would it be possible to obtain a degree of assurance that the requisite standard was being maintained.

Milk may be graded on the basis of (*a*) chemical composition; (*b*) hygienic qualities; or (*c*) a combination of *a* and *b*. A combination of the chemical and hygienic standards would constitute the only sound procedure. The official grading of milk could only justify itself provided it proceeded along lines calculated to gain the confidence of the consumer by conveying an assurance that the milk purchased was in a sound, wholesome condition, and possessed not less than a minimum nutrient value as measured by a fixed chemical standard. It would require also to provide a constant stimulus to the producer to aim at maintaining and improving the quality of his produce by excluding from classification milk which did not conform to minimum standards, both nutrient and hygienic, and by conferring on him the right to demand a higher price which bore a distinct relationship to the standard of quality which he succeeded in attaining. It must be fairly obvious that grading on the basis of chemical composition alone would not fulfil these conditions. It would convey to the consumer no assurance that the milk purchased was in a sound, wholesome condition, nor would it stimulate the producer to exercise the care and supervision necessary to prevent the contamination which contributes materially to early depreciation, and which may operate adversely and more seriously in other respects.

Similarly grading on a hygienic basis only would, by its essential deficiencies, defeat its own purpose. The value of milk is dependent wholly on its nutrient properties. Grading irrespective of food value would entail the granting of an official certificate of quality to an article of food whose nutrient properties did not necessarily conform to a minimum standard. It would confer on the producer a right to demand a higher price without protecting the purchaser against the supply of a food substance which was deficient in its essential qualities. It would be defective in that it would provide no stimulus to the upward grading of dairy stock and the consequent improvement in the quality and quantity of their produce.

If the official grading of milk is to be undertaken, it is essential to realise the importance of grading on this double basis, no matter whether the principle

is to be applied generally or only to a limited extent. The need for improvement in the hygienic quality of milk is admitted, and it is being strongly impressed on the public, but too little attention is being directed to food values. There is thus more than a possibility that the importance of the latter may be obscured by the prominence given to the former. Efforts to improve the hygienic and nutrient properties of milk ought to proceed hand in hand, and if grading is to serve a really useful function, and is to justify the cost of its application, the scheme must be well balanced, and have for its object an all-round and not a one-sided improvement.

The fat content of milk provides the simplest means of arriving at a measure of the nutrient properties of milk, and in grading on a basis of chemical composition the percentage of butter fat must constitute the standard. It is eminently desirable that a minimum legal standard for milk should be set up which should be the present presumptive British standard of 3 per cent. fat, 8·5 per cent. solids not fat.

There is quite a considerable volume of opinion that this standard is too high, and that it cannot be maintained consistently in the mixed milk from an ordinary herd of dairy cows. It is admittedly impossible under conditions of inefficient management, of indiscriminate breeding, or in the absence of judgment in the selection of stock to be retained in a dairy herd, but the force of this admission lies in its demonstration of the need for careful and scientific selection of the stock to be retained and used for breeding in order that a measurable grading in an upward direction may be effected, both in respect of quality and quantity of milk yield. The work of the Scottish Milk Record Societies has demonstrated that much can be accomplished in this respect, and has proved that a definite and measurable upward grading is a practical proceeding in breeds which, in the absence of scientific selection, earned the reputation of low fat producers.

A butter fat standard is demanded of all milk in certain of the British Colonies which is higher than the presumptive British standard. Tasmania and Victoria demand 3·5 per cent. of butter fat, Canada, West Australia and New Zealand 3·25 per cent.* In 36 States in the United States of America the standard demanded in 2 is 2·5 per cent., in 18, 3·0 per cent., in 11, 3·25 per cent., in 4, 3·5 per cent., and in 1, 4·0 per cent.†

(*) Final Report of Commission on Production and Distribution of Milk.
(†) 27th Report of the Bureau of Animal Industry, U.S.A.

The American Association of Medical Milk Commissions lays down a 4 per cent. fat standard for certified milk with a permissible range of 3·5 per cent. to 4·5 per cent., the fat standard to be determined at least once each month. Great Britain has always claimed pre-eminence for the quality of her live stock, but if we are obliged to plead inability to attain a lower standard than has been found practicable in other countries, it must at once be admitted that, so far as our dairy stock is concerned, the pre-eminence claimed rests on an unsound basis.

Improvement in the standard of chemical composition of milk can be accomplished by effort and by the exercise of judgment on the part of the producer in the selection and management of his stock. Grading of milk is definitely associated with a grading of prices. The better grades are justly entitled to a higher price, and superiority is rightly claimed for milk whose butter fat content exceeds the minimum laid down. A sound system of grading ought to recognise that superiority and provide the producer with the means of securing an appropriate return.

It has already been stated that absolute uniformity from day to day in chemical composition is an unattainable ideal, and in working out the details of any scheme of grading a permissible range of variation within specified limits should be provided for in regard to the higher and better qualities of milk. The quality must be based on an average of a series of tests. In Scotland at least a great deal of the information on which grading on a basis of butter fat content might proceed has already been accumulated by the Scottish Milk Record Societies. It should be possible to arrange for the records of societies to be made available for the purposes of an official scheme of grading, and the possibility of employing their machinery should be worth considering as contributing to economical working. They could not replace official tests carried out by a grading authority, but ought to be most useful complements to them.

The Astor Committee, in discussing the grading of milk, considered that its hygienic qualities could be assessed by a system of "supervision through inspectors of the methods of production and handling" and by bacteriological standards which require that "samples shall contain not more than a specified number of bacteria per c.c."

Neither inspectional supervision nor bacteriological standards provide a perfect means of checking the hygienic qualities of milk, but used conjointly they are more likely to arrive at a fair estimate of hygienic qualities than if either be used alone. The fundamental weakness of a bacteriological standard exists in the necessity of basing it almost wholly on numbers of bacteria irrespective of kinds, but used in conjunction with supervision by inspectors bacteriological standards are of material value in providing a test of the efficiency and adequacy of the work of inspection.

In an attempt to arrive at an estimate of the hygienic quality of milk through the agency of supervision by inspectors, it would be necessary as a first procedure to set up a basal standard for judgment in order that estimates formed might be comparable in at least an approximate degree. The various dairy score cards which have been devised represent efforts to set up this standard. It is obviously impossible to ensure absolute uniformity in any procedure the results of which are dependent on individual judgment, but it may fairly be claimed that the score card system provides a means whereby the nearest approach to uniformity may be achieved. Descriptive details of score cards which have been devised are unnecessary at this stage—they have been reproduced in every text book on milk which has been published during the past ten or fifteen years. The first essential to their use in connection with the grading of milk would be uniformity of type. As applicable to the farm they should be as comprehensive as possible, and should attach the degree of weight which rightly belongs to methods of collection, and handling, and to the health of the workers as well as of the animals producing the milk, for on these depend in a very large measure the freshness, soundness and wholesomeness of the dairy produce. It would be necessary to ensure that the hygienic standard demanded on the farm would be maintained throughout all stages of handling and transport between the cow and the consumer, and the score card system would require to be extended to cover wholesale and retail depots as well as conditions of transport and delivery. Apart from bottling and sealing on the farm, this would appear to be the only way in which a reasonable measure of assurance could be obtained that efforts made on the farm would not be more or less completely nullified before the milk reached the consumer. Grading would demand for each grade of milk a stated percentage of the maximum scores obtainable.

In the application of bacterial standards to the grading of milk, the choice lies between the numbers and the kinds of bacteria present. The tendency to follow the lead of the United States and to attach to numbers an importance greater than rightly belongs to them is very pronounced. This is unfortunate, if only for the reason that it is liable to raise an undue sense of insecurity in the minds of the general public, the majority of whom labour under the belief that all bacteria are disease producing, or at least potential sources of danger to the human race. As a matter of fact, the vast majority of the bacteria found in milk are not only incapable of harm to the consumer, but the predominant forms are essential to the farmer in certain dairy processes. Without their aid the manufacture of butter and cheese cannot be accomplished. As an evidence of the extent to which numbers alone may be misleading, it is only necessary to state that butter-milk, derived from sources unimpeachable on the score of cleanliness, regularly contains five hundred to one thousand million bacteria per c.c., that it is palatable, and that it may be partaken without risk to the consumer. This fact does not, however, modify the necessity for excluding as far as practical the bacterial contamination of milk, for the bacteria essential to the manufacture of butter, etc., also contribute largely to early souring, and, moreover, they co-exist in nature with bacteria whose influence is distinctly prejudicial.

It is not contended that numbers do not possess a significance from the public health and from the economic points of view. Heavy bacterial contamination indicates carelessness in collection and handling, and indifference to the fact of contamination cannot be differentiated from indifference to the nature of the contamination. In other words, dirty milk containing large numbers of bacteria is more likely to contain pathogenic organisms than milk in the collection of which careful supervision is exercised. Large numbers of bacteria also indicate that deterioration and souring have already commenced, or will take place rapidly ; they are evidence that the qualities of soundness and freshness have been impaired.

Practically all the numerical bacterial standards for milk which have been set up have referred to

the numbers present at the time of delivery to the consumer. The numbers in market milk would have a greater significance if it were possible to differentiate between those resulting from multiplication and those attributable to original contamination; but this is obviously impossible. From an administrative point of view, farm standards would appear to have a greater value than market standards, inasmuch as they would provide a measure of the original contamination and afford guidance as to the degree of care exercised in collection. The numbers of bacteria present in milk at the time of delivery afford less guidance and show very material variations, according to the conditions under which it has been retained. Under favourable conditions, bacteria multiply rapidly in milk. A milk, originally clean, exposed to conditions favourable to multiplication may show a much higher bacterial count after a few hours than one originally dirty and possessed of much greater potentialities for harm to the consumer, but which has been retained under conditions unfavourable to growth.

Assuming numerical bacterial standards were to be used for the purposes of grading milk, it would be necessary as a preliminary procedure to standardise the methods of examination in every detail. Bacterial counts do not claim to be more than estimates of the numbers of bacteria in milk, and without standardisation of methods it would be impossible to obtain results which would be even approximately comparable. This would be especially true if grading were applied on a large scale, since the routine work of estimation would necessarily devolve on workers sufficiently trained to carry it out, but not highly skilled in the technicalities of the methods they would be called on to adopt. The almost inevitable consequence would be variations which would materially detract from the value of the results obtained. The omission to detail the procedure by which an estimate is to be made of the numbers of bacteria present in order to obtain the Ministry of Food's licence to sell Grade A (Certified) Milk is a defect which materially diminishes any value which might otherwise be attached to the bacterial standard laid down.

The cost of applying numerical bacterial standards in any general system of grading milk would be heavy, and would constitute a material objection to their adoption. The force of this objection would be strengthened by the fact that the value of the information gained would not be proportionate to the cost of securing it. Numerical standards are fundamentally defective, inasmuch as they consider numbers only and take no account of kinds. In this respect they constitute an unsound guide to the quality of milk, a few pathogenic bacteria being capable of infinitely more harm than millions of the saprophytic organisms which always constitute the majority of the bacteria found in milk. Numerical bacterial standards have a most useful place in administrative work, but it would be difficult to justify their inclusion as a fundamental part of a general system of grading milk.

If it were possible to determine the different kinds of bacteria present in milk by a simple and rapid procedure, valuable information for the purpose of classifying milk would be available, but unfortnately the means of accurate and rapid differentiation do not exist. Pathogenic organisms naturally possess the greatest significance. The determination of pathogenicity requires time, and in the majority of cases the presence of pathogenic organisms in milk is clinically manifest earlier than can be demonstrated in the laboratory. The bacillus of tuberculosis is an exception to this general rule, and it is by far the most important and the most common of the pathogenic organisms found in milk. The tuberculin test provides the means whereby an assurance can be obtained that this dangerous micro-organism will not be present in milk from a particular source. It also provides a valuable means whereby milk may be graded definitely and simply into two main classes—milk from tubercle-free herds and milk from non-tested herds. So far as the other specific infections occasionally encountered in milk are concerned, sanitary inspection must, in the present state of knowledge, provide the measure of the risk of their entrance into the milk pail.

The determination of the presence and numbers of the coliform group of organisms constitutes a feature of some bacterial standards for milk. One of the conditions attaching to the Ministry of Food's licence to sell Grade A (Certified) Milk provides that "The milk on examination at any time before delivery . . . must not contain B. Coli in 1/10 c.c. (in each of two tubes)." The value of this addition to a numerical bacterial standard is very doubtful. Under existing conditions it cannot be claimed that it provides any

more reliable information as to the hygienic condition of milk than can be secured more quickly and simply by the ordinary numerical bacterial estimation.

It is impossible to leave this subject without reference to the commercial pasteurisation of milk so extensively used in large towns. Commercial pasteurisation consists for the most part in heating milk to a temperature of 140° F. to 150° F. and immediately cooling it. Objection may rightly be urged against the sale of this milk without disclosing the fact that it has been heated, but the heating process has a very material value, and much more may be advanced in its favour than against it. The term pasteurisation ought, however, to be defined and limited to a process which will render the tubercle bacillus innocuous, since in its capacity for harm it occupies the place of paramount importance, and it is one of the most resistant organisms found in milk. It cannot be claimed that the ordinary "flash" commercial pasteurisation will accomplish this object. The evidence shows that a temperature of 145°F. continuously held throughout the volume of milk for a period of thirty minutes or of 175°F. for thirty seconds can be depended upon to render the tubercle bacillus harmless. The commercial pasteurisation of milk by the "flash" process as well as by the more efficient "holding" process should receive official recognition and be permissible in respect of graded milk, provided that the milk so treated was not sold as raw milk.

Conclusions.

A system of grading could not be introduced and applied at short notice to all classes of milk. If grading is officially adopted, it must be a matter of growth, beginning with the certification of the higher grades of milk. Its success and the extent of its growth would be dependent on the response it proved capable of producing from both producer and consumer. In the application of a system of grading, milk should be divided into two main groups, (*a*) from tubercle-free herds; (*b*) from non-tested herds. Each group might then be subdivided on identical lines into two or more classes, according to combinations of chemical and hygienic standards laid down. Milk which consistently falls below a fixed legal minimum standard of chemical composition should be excluded from grading. Permission to sell milk which fails to attain a minimum hygienic standard should only be granted after efficient pasteurisation. Pasteurisation by both the "flash" and the "holding" processes should receive recognition in connection with an official grading of milk.

The time allotted makes it impossible to refer to the many administrative problems which would arise in the application of a system of grading or to pass any comments on the expenditure which it would entail. Both are material, and the attention of the Association might profitably be directed to them on some future occasion.

World's First Poultry Congress.

The world's first Poultry Congress, convened by the International Association of Poultry Instructors and Investigators, will be held at The Hague, Holland, on 6th—13th September this year. Delegates from the majority of Governments, from the principal teaching and experimental institutions dealing with this subject, and from all the large poultry societies will meet together in conference and exchange views and experiences in all the more important aspects of poultry keeping. Private individuals who are keenly interested are also to be made welcome, and are to be given freedom of taking part in the debates.

In addition, the Netherlands Government is co-operating in every possible way with the promoters of the Congress, which is itself under the patronage of the Queen and Queen Mother of Holland. Prince Henry of the Netherlands is president of the honorary committee, on which are several Ministers of the Netherlands Government. The executive committee which has been appointed by the Netherlands Minister of Agriculture, Commerce and Industry, has as its first president, Dr. H. J. Lovink, of The Hague, and as its second president, Mr. Ed. Brown, F.L.S., now president of the British National Poultry Parliament.

The Congress will be divided into four sections, each of which will have its own bureau to regulate its work. It is expected that it will be possible to appoint sectional chairmen who are good linguists as well as eminent poultry experts, and it is intended that all reports and other publications issued will be printed in at least three languages. A wide range of papers, written by leading authorities in the poultry world, will be read at the Congress, including one by the official representative of the Ministry of Agriculture on "Poultry Education in England and Wales."

Membership of the Congress is open upon payment of a fee of £1, and all who are interested in the development of the poultry industry are cordially invited to attend. Arrangements have been made for the accommodation of visitors at fixed and reasonable rates. The programme includes excursions to neighbouring places of interest.—*Ministry of Agriculture and Fisheries.*

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HYGIENE: THE RELATION OF HEALTH TO THE ENVIRONMENT.

The body is fashioned by nature for getting food by active exercise. The wild animal which survives in the struggle for existence enjoys perfect fitness and health. Civilised man, on the other hand, needs a volume to contain a list of the diseases from which he suffers, and the animals he has taken from nature to serve his ends are afflicted the greater with bodily ills the more the state of their "domestication" approaches that of his "civilisation."

The question arises as to how far the evils of this system can be mitigated without hindering its progress. For no one has a right to reproach the breeder who pursues an intensive form of domestication for the attainment of a particular purpose, any more than he has to condemn the founders of our modern system of civilisation, involving, as it does, the herding together of large masses of human beings in crowded centres, to toil in confined atmospheres to obtain their food from nature by some route far removed from the direct one of their ancestors.

Productive breeding implies the conversion of food energy with the maximum degree of efficiency into those products for which man took to himself these animals from their state of nature. This further implies that when the animals are destined to furnish him with materials for his own nourishment the amount of energy contained in the food consumed by them must be diverted as far as possible towards the manufacture of these materials; the maintenance requirements must be depressed, which connotes curtailment to the lowest possible degree of active exercise and avoidance of atmospheric changes that might involve conversion of the energy reserves into heat to keep the body at its uniform temperature. Such animals must thus at certain periods of their lifetime be "housed," and this necessarily involves for them fundamental changes from the natural conditions of life.

Can such changes be fashioned so that they are yet in accordance with the laws of what we term good "hygiene"? What is hygiene as applied to domestication, or, as it may be conveniently termed, veterinary hygiene? Does it really exist? For if it is hygiene, meaning "health," equivalent to that of the wild animal in its state of nature and denoting perfect fitness for procuring its own food, then it is not possible of attainment. But there is a science or art of hygiene as applied to civilisation, which aims during the progress of this complicated phenomenon in the human race at making the lives of the people happy and comfortable, their bodies free from disease, and ascertaining the conditions under which the maximum of work can be performed without body fatigue. If that be so, then there is in truth a veterinary hygiene, which should aim likewise at securing for animals during the progress of domestication, if not happiness and comfort, at least absence of unnecessary suffering and pain, freedom from disease, and in the same manner it should aim at elucidating the conditions under which the maximum of production, in the form of work or foodstuff (meat, milk), can be yielded at the least possible cost.

Great strides have been made during recent years in the investigation of factors, physiological and pathological, which influence the preservation of health. These are well illustrated in the abstract, which we publish in this number, of an important article contributed by the eminent physiologist, Dr. Leonard Hill, F.R.S., of the National Institute for Medical Research, on "The Relation of Health to Atmospheric Environment" (*International Journal of Public Health*, 1921, May-June). After having therein sketched the way of healthy living which is deduced from physiological observations and experiments, Dr. M. Greenwood supplements the article further by an enquiry as to whether the historical development and present position of any disease taking exceptional toll of civilised mankind can be more fully understood if we read its story in the light of physiological experience. He takes for his purpose the fitting example of pulmonary tuberculosis, and endeavours to trace statistically its distribution and explain its incidence among the various classes and trades in the population from the earliest times to the present. The enormously increased incidence of the disease in particular amongst males due to crowding since the institution of factory employment is brought out clearly. and its ravages among the peoples of Central Europe following upon the war would appear to

be closely associated with the conditions of semi-starvation there prevailing. The moral which Dr. Greenwood draws from this study is as follows: "The art of medicine began in the incantations of the witch doctor; what is called public opinion is always attempting, and often successfully attempting, to force it to reassume that role.

"When the inspiration of classical Greek science, which found its noblest medical expression in the writings of Hippocrates, was spent, clever unoriginal minds reduced medicine to a system needing much study to master and as unreal and useless as the academic political economy of the early Victorian age. The witch doctor had returned and held sway for more than 1,000 years The revival of experimental physiology in the sixteenth and seventeenth centuries and the efforts of such great physicians as Sydenham removed this incubus. But the conception of the witch doctor, the notion of some panacea, is far too congenial to the human mind to be finally dispelled. The popular idea that freedom from disease can be secured by specific immunisation, by this or that *ad hoc* method, is the old appeal to the witch doctor clothed in modern phraseology. The art of preventive medicine does not consist in a manipulation of specifics, but in securing a high standard of healthy living. If this is not secured, so soon as one disease is countered by a specific another will take its place, even as during the war we witnessed a crescendo of improved methods of destruction and improved methods of defence. What are the conditions of healthy existence have long been known; the hygienic rules of Hippocrates 400 hundred years before Christ, and of Celsus in the first century of our era, are still necessary and sufficient. The task of preventive medical science is not to discover new rules but to devise methods of measuring how far the rules we know are or can be obeyed. . . . In one important instance, that of atmospheric changes, the methods universally employed a few years ago and generally relied on now are inadequate. Research prosecuted on these lines will not lead to the discovery of new specific 'causes' of diseases; it will fulfil a higher and, from the standpoint of *preventive* medicine, far more important purpose, viz., the revelation of how life may be lived under physiological conditions. The advice given to Naaman the Syrian is no more popular now than then; reinforced by the teaching of physiology it may perhaps be followed."

Abstracts and Reviews.

The Relation of Health to Atmospheric Environment.

Man, evolved some million years ago, has immense inborn power of resisting cold. The experience of shipwrecked people, and of citizen soldiers exposed to the utmost rigours of weather in the trenches, shows this power. The soldiers in the great war well fed, clothed and exercised, but at times wet, chilled and exhausted were, compared with the civilian population at home, exceptionally free from respiratory catarrh. Wild men, such as the Fuegians, stand exposure to most inclement weather with scanty or no clothing and no houses or artificial heat. They practise infanticide to keep the population down to the food supply. They, like the wild animal, shelter in thickets or caves, where, owing to wind and temperature difference between their bodies and the atmosphere, there is free exchange of air.

The experience of open-air schools and sanatoriums confirms the view that life spent largely in the open benefits the health of those subject to catarrhs, those with over-nervous temperament, those with heart weakness, etc.

The Japanese have carried out their wonderful development of artistic excellence in craftsmanship in slightly-built dwellings with the aid in cold weather of nothing but charcoal braziers to warm their hands at, depending on clothes and exercise to keep their bodies warm. On the other hand, the endeavour in the last century or so of Europeans and Americans dwelling in the colder climates has been towards building draughtless houses and securing inside these by artificial heating a climate similar to that on a still, oppressive, warm summer day. The low cooling power of stagnant air of rooms artificially heated by radiators depresses the metabolism to a low level. In place of the body being kept warm naturally by the stimulation of cool air exciting muscular exercise and glandular activity, and so enhancing the combustion of food, it is kept warm by the blanketing effect of warm stagnant air, so that sedentary occupations, amusements and rest can be carried out in warm comfort and a minimum of open-air muscular exercise be taken.

The traditional fear of cold is handed down from mother to children at her knee. For fear of their "catching cold" they are confined indoors and over-clothed. They are debilitated and exposed at the same time to massive infection in crowded places. They require well-chosen food containing all those vitamines or principles of growth which are found in milk, the young green shoots of plants, grain foods with the germ and outer layers not removed by the miller. At the same time they require the stimulation of abundant open-air exercise to make them eat and metabolize their food.

Out of doors the skin is cooled and dried by the wind—the wind freely ventilating the clothes. The air on the most calm and oppressive day out of doors is never as still as it is in a shut up room. The skin is also warmed by the radiant energy of the sun, and this actively causes evaporation. The wind and the sun affect the flow of water from the lymph and blood through the skin ; the wind cools the blood in one part, the sun warms it in another ; the shorter sun rays act chemically on the white skin as evidenced by sunburn and pigmentation. There is reason to think that the skin is a great seat of production of immune substances which protect us against infection. Exposure of the skin to sun and wind has a profound effect upon it, and through it on the health of the body. Cool winds insure the removal of the body heat by convection, and keep the cutaneous vessels constricted so that the blood is driven in greater volume through the viscera ; the sun and warmth dilate the cutaneous vessels and enhance the flow of blood through the skin, and excite perspiration. These to and fro changes of the skin's condition make for health. The monotonous life spent in an environment of over-warm, stagnant and moist air entangled in their clothes when people are confined in rooms, often crowded, is contrary to those naturally changing conditions which occur out of doors.

The air which is breathed into the lungs, whatever be its content of moisture or its temperature, is breathed out approximately at body temperature and saturated with moisture at this temperature. What matters to the skin and respiratory membrane is not the relative humidity, but the actual vapour pressure of the air which comes in contact with it. Cold saturated air is excessively dry when warmed up to body temperature, and takes up much moisture from the body, warm saturated air (or even only half saturated) far less. The vapour pressure of saturated air at —20° C. is 0.96 mm. Hg., at —10° C. 2.16, at 0° C. 4.58, at 10° C. 9.21, at 20° C. 17.54, at 30° C. 31.83, at 35° C. 42.2, at 40° C. 55.3. A cubic metre of air can hold approximately as many grammes of water when saturated as shown by the vapour pressure figures just given. The breathing of cool air entails then much greater evaporation from the respiratory membrane and consequent greater outflow of lymph through and secretion of fluid from it. The membrane is better washed and kept clean from infecting microbes by such outflow. The breathing of cool air entails, too, the greater flow of arterial blood through the membrane in order to keep it warm, and at the same time warm the inhaled air. Vigorous open-air exercise may increase the volume breathed five times, and this on a cold day means far more blood, lymph and secretion fluid washing the respiratory membrane. The open-air worker is thus better protected, while he escapes the massive infection from " carriers " which occurs in shut up rooms. It is the bronchitic with chronic inflammation and those with acute catarrhs who should not expose themselves to the changes of atmosphere between a warm room and wintry out of doors. What suits the bronchitic and those in the state of " chill " from infective catarrh must not be taken as suitable for the healthy. For these dryness of cold air is not trying, and the Alpine resorts are most bracing and health-giving. Heat, rather than dryness, tries us in desert air. In the Sirocco in Palestine the relative humidity sank to 2%, the temperature being 43° C. In the alpine winter mid-day the physiological saturation-deficit—that is the difference between the vapour pressure of the air and the vapour pressure of the air saturated at the body temperature—may be even greater ; this is owing to the small amount of vapour held in the air at the low temperature there pertaining (Dorno).

One gramme of water evaporated takes away 600 calories of heat, so that the sweating mechanism is a very effectual method of keeping the body cool, but it must fail in *saturated* atmospheres at temperatures at or near to body temperature. In hot dry atmospheres it may become exhausted, especially in the sick, e.g., those suffering from constipation, malaria, etc. A wet sheet put on the body, and a fan set to blow on this, prevents heat stroke in a hot dry atmosphere by setting up an artificial evaporation. A hot dry wind may heat the body by convection more than it can be cooled by the evaporation of sweat; to prevent this effect Arabs, in a sandstorm, crouch on a desert and cover themselves with their robes.

Moist warm atmospheres are trying and reduce the efficiency of workers, because of the difficulty of getting rid of body heat. If the air is stagnant, the layer entangled in the clothes becomes saturated and raised to skin temperature.

Wet bulb temperatures in factories and mines are physiologically much more important than dry bulb temperatures, so, too, the vapour pressure is much more important than the relative humidity, and the velocity of movement of the air is most important of all, for on this chiefly depends cooling by convection and evaporation.

The dry bulb thermometer indicates the average effect of the temperature of the air and walls of the enclosure on itself ; it does not show the cooling and evaporating power of the environment on the skin and respiratory membrane. It is a static instrument, while the body is dynamic producing heat which must be lost at an equal rate. To measure these cooling and evaporative powers, I have introduced the katathermometer, a large-bulbed spirit thermometer of standard size and shape, graduated between 100° and 95° F. The bulb is heated in hot water in a Thermos flask until the meniscus rises into the small top of the bulb. It is then dried, suspended, and the time of cooling from 100° to 95° F. taken with a stop watch in seconds. The number of seconds divided into a factor number (approximate to 500 and determined for each instrument) gives the cooling power

by convection and radiation exerted on the surface of the "kata" at approximately skin temperature in millicalories per sq. cm. per sec. The operation is repeated with a moist cotton muslin finger stall on the bulb and the wet "kata" cooling power obtained, the cooling power due to evaporation, radiation and convection. The difference between the two gives the evaporative cooling power.

In Britain the mean dry "kata" cooling power on the top of observatories is from 20-25 in July-August and about 40 in January–December. In a year's observations taken in a courtyard at Lincoln at 9 a.m., the "kata" only twice gave a reading as low as 7. Extensive observation shows that the dry "kata" cooling power is about 6 in ordinary rooms occupied by sedentary workers. It certainly should not be less than 6 excepting under conditions of outside temperature which make it impossible to secure such a cooling power by means of fan ventilation. It is frequently found to be as low as 4 and even 3 in factories and offices when proper attention to ventilation would easily secure readings of 6.

When physical exercise is being done the reading should be higher, say 7 or 8, and even more when heavy labour is being performed. By keeping the cooling power in proper relation to the work done and heat output of the worker—four times as much energy is spent by the body in heat as in doing external work—rhe latter can be kept from sweating; working with comfort and ease he will be naturally stimulated to give greater output. In the case of a squad of soldiers walking in a cool breeze on level ground a rate of walking was found —and the metabolism and body heat loss per sq. cm. per sec. calculated for this—at which the cooling power of the wind just sufficed to prevent visible sweating. It was found that a dry "kata" cooling power four times that of the estimated body heat loss per sq. cm. per sec. sufficed.

At a large English steel tube drawing factory, clusters of large air ducts have been installed over the heads and to the side of the workers in front of the furnaces. The air current from these is so great that when the furnace doors are shut one feels too cold and moves away. The men are warmed by radiant energy and cooled by wind alternately as they draw the tubes from the furnaces, or pause. The effect is as congenial as the sun on a breezy day coming in and out from white clouds. The output here is stated by the firm to be greater than from any other factory of like kind; the firm also states that there is no industrial unrest. A great improvement in health and efficiency will, I believe, follow the general application of a proper cooling power to the work in hand.

How much greater is the effect of the cooling power of wind than of change of temperature in stagnant air is shown by the following table:—

Cooling Power by Radiation and Convection in millicalories per sq. cm. per sec. exerted on "kata" surface at 36·5° C.

[The loss by radiation is assumed to be the same as in a chamber the walls of which are at the given temperature.]

Temp.	9 metres per sec. 20 miles per hour.	4 metres per sec. 8·8 miles per hour.	1 metre per sec. 2·2 miles per hour.	0·5 metre per sec. 1·1 miles per hour.	Still air
0° C.	62·0	45·6	27·7	22·6	9·8
5	53·5	39·4	23·9	19·5	8·5
10	45·0	33·1	20·1	16·4	7·1
15	36·5	26·8	16·3	13·3	5·8
20	28·1	20·6	12·5	10·3	4·4
25	19·5	14·3	8·7	7·1	3·1
30	11·2	8·1	4·9	4·0	1·7
35	2·3	1·9	1·1	0·9	0·4

The "kata" can be used as an anemometer, the formula connecting temperature and wind with the cooling of the dry "kata" having been worked out in wind tunnels. The formula, as stated in my Report to the Medical Research Council on the Science of Ventilation and Open-air Treatment (Spec. Rep. Series 32 and 52, H.M. Stationery, Office, London) was $H/\theta = 0{\cdot}29 + 0{\cdot}49\sqrt{v}$.*

The above figures are calculated on that formula.

Renewed investigation at a wider range of velocities just completed necessitates a modification of this formula to $H/\theta = 0{\cdot}12 + 0{\cdot}47\sqrt{v}$.

The wet "kata" reading is found to be about 18 in rooms which do not feel close where sedentary work is being done. In warm, moist spinning sheds and mines it may be as low as 10·5. The wet "kata" reading is of great importance when the temperature approximates to body temperature and cooling by convection and radiation becomes greatly reduced. Evaporation from the wet "kata" depends on the vapour pressure and wind, and the latter has a very great effect. A formula has also been worked out for the wet "kata." It must be borne in mind that the "kata" indicates cooling and evaporative powers from its own surface, not from the human body. Its bulk is comparable to the body of a mouse, and is much smaller than the parts of a human body.

The stimulating and suggestive lines of enquiry into the relation of health and wealth to atmospheric environment opened up by Professor E. Huntington (1) require to be carried out further with attention to readings of cooling and evaporative powers.

An extensive series of observations on people sitting in ordinary clothes indoors, or outdoors exposed to the wind, shows that the metabolism is correlated very closely with the dry "kata" cooling power. The cheek temperature varies greatly with exposure, e.g., say from 35° C. in

*θ = difference between 36·5° C. and the temperature of the atmosphere. v is in metres per second.

over-warm factories, 33° C. in factories which do not feel close, to 20° C. or even lower out of doors exposed to cold winds. The cheek temperature also has a close relation to the metabolism when people are exposed out of doors to cool conditions.

Exposure to cold wind may double the metabolism of a man sitting at rest. His natural inclination is not to sit still and feel chilled, but to be active and keep himself warm. It is to this impulsion to activity and raising of metabolism that open-air life largely owes its beneficial effect.

In the winter climate of North America the cold outside air when heated up becomes very dry, and increased evaporative power acting on the skin indoors cools the body. There is, too, no source of intense radiant heat (a fire) in the rooms, thus high temperature of 70° F., or more, are habitual.

If the air could be moistened, lower temperatures would be found adequate, as in England, where a temperature of 63° F. is considered sufficient in an office heated by hot water radiators with natural ventilation and no sensible draught, or with a plenum system.

In the tropics there is required the building of houses so that through draught is everywhere obtained, with wide verandahs (ventilated), double roofs with ventilated air space (the vents screened to keep out animals), whitened walls, fan ventilation. The clothes must be of the lightest texture and worn widely open at neck, sleeve and knee, to allow ventilation. The skin should be allowed to pigment so that a gauzy material can be worn without sunburn resulting. Sleep should be taken on roofs where convection and radiation heat losses are greatest; a mat should take the place of a mattress, a cradle over the body covered with a sheet kept wet by a spray, or drip of water and a fan to cool by evaporation, may be ussd in hot dry weather. The diminution of protein food, which stimulates metabolism and heat production is indicated. Monkeys fed on rice and ripe bananas stand exposure to tropical sun out of doors. The taking of vigorous outdoor exercise keeps men much fitter in the tropics than women shut up and cooking in houses. The body weight of well-nourished people could safely be reduced till it became six-tenths of the pre-war figure, according to German reports on the effect of the blockade on the civilian population. A diminution particularly of heavy weights in the tropics is an obvious advantage, the surface exposure being thus increased in proportion to the mass of the body.

In England belief in the open, or gas, fire as a source of radiant warmth is justified. The moist, misty, mild weather is thus counteracted. Gas fires must replace coal fires to secure economy of coal energy and remove the pall of smoke, dirt and destruction of vegetable life from the towns, and the great loss of health and wealth these entail. The theory that chemical purity of the air is the one important thing has permitted the establishment of slum cities, underground places of business, office rooms lit by wells, etc.

It must be realised that the carbonic acid is never increased or the oxygen reduced in crowded rooms so as to harm to the least extent the occupants. Moreover, after exhaustive experiment by physiologists proof is not forthcoming of those subtle organic poisons supposed to be exhaled by human beings. Massive saliva spray infection from carriers of pathogenic germs*, and the physical state of the atmosphere depressing the vitality, these are the agents which cause ill-health.

The garden city provides out-door exercise to be taken in games and gardening, and the interests natural to most men of perfecting the homestead and raising stock and plants. Rabbits and fowls yield protein food, goats yield milk, these and the green foods secure ample supplies of essential amino-acids and vitamines. The man with his eight-hour day at the factory has his leisure filled in by productive work, and he and his family are kept well fed, exercised, interested, healthy and happy. Granting there is sufficient wage earned to buy a sufficiency of food, the garden city with its factories is the main solution to health troubles of civilised people. With the garden city must go discipline through education of the young in the simple ways of keeping fit and enjoying life.

The experience of Germany during the war, and still more of Austria after the war, upheld the truism that in the absence of a proper food supply, all that has been written above about open air stimulating metabolism and efficiency is of no account. Cold is an enemy of the semi-starved, it is a stimulating friend of the well fed.

Clinical and Case Reports.

An Unusual Monstrosity.

(By T. McDermott Kelly, M.R.C.V.S., Co. Galway.)

Some weeks ago I was called in to see a pure bred Clydesdale filly foal born the previous day with a well-developed mammary gland in full lactation. In fact the foal had to be milked twice a day for a week, and continued to give milk for a fortnight. The udder has now subsided and the secretion has stopped. The foal is otherwise quite normal and healthy, with the exception of the head, which has an old appearance, and the eyelashes are exceptionally long and thick.

Generalised Tubercle in a Two-year-old Colt.

(By T. McDermott Kelly, M.R.C.V.S., Co. Galway.)

On the same farm as was the scene of the abnormality above I have lately held a post-mortem

* Experiments by S. R. Douglas and the writer, just completed, show that spray infection is far greater in a close than in a well-ventilated room.
["The Relation of Health to Atmospheric Environment."—*International Journal of Public Health*, 1921, May-June.]

examination on a two-year-old "Irish draught" colt, which had not been thriving for at least twelve months. The carcase was emaciated, there was miliary tuberculosis of both lungs, tuberculous lesions in the pericardium, pleura, peritoneum and the right kidney. The tracheal, bronchial mediastinal, sublumbar and mesenteric lymphatic glands were very much enlarged and hard. Many of them were caseous, but the greater number were calcareous.

The immediate cause of death was hæmorrhage following rupture of the liver, which organ was very much enlarged, and had undergone fatty degeneration. There were no naked-eye tuberculous lesions in the liver.

I record this case as in my experience miliary tubercle of the lungs in the horse is rather uncommon.

The Bottle in Eversion.

(By J. C. Coleman, M.R.C.V.S., Swindon.)

Subject.—Four years old small shorthorn cow, with second calf. Eversion of uterus occurred some time during night of May 16th last. I was called to same about 8-30 a.m. on the morning of the 17th.

Symptoms.—I found uterus completely everted, much swollen, discoloured and placenta adherent.

Treatment.—After rendering parts as aseptic as possible, I detached the adherent placenta, and cleansed uterus as before with a solution of lysol. This done, I sprinkled lb. ss. of granulated sugar over its surface, having seen this recommended as rapidly reducing the effusion which occurs, but I observed no effect therefrom. I gave a hypodermic injection of six grains morphia, and successfully reduced the prolapsus, placed two hydr. perchlor. pessaries in uterus and inserted a quart champagne bottle (base foremost) into the vagina, securing this in position by a small rope attached to neck of bottle and tying each loose end, one on either side, to a rope which had previously been placed tightly around the abdomen just in front of pin bones.

May 18th, 19th, 20th and 21st I removed and cleansed bottle, and again inserted pessaries and bottle after having thoroughly washed out the uterus with sol. pot. permang.

I gave chloral hydr. and tr. aconite three times daily to stop the heaving, which I was unable to do until the 22nd, when it had ceased, and I removed the bottle.

The uterus was flushed out daily with a solution of pot. permang. The appetite had become almost normal, and convalescence appeared proceeding quite satisfactory until June 5th, when I was called again. as the uterus had been again everted. I found it was very indurated, and could hope for no good result by again reducing it. I therefore recommended amputation, which was agreed to, and I administered chloroform and performed the operation at once. Since this the case has never looked back, and has made a complete recovery, without complication of any sort. I saw cow for last time on June 27th.

Association Reports.

National Veterinary Medical Association of Great Britain and Ireland Limited.

Meeting of Council.

A meeting of the Council was held at 10 Red Lion Square, on Wednesday, June 29th, 1921.

The President, Dr. O. Charnock Bradley, occupied the chair, and the following were present :—Messrs. F. G. Samson, P. J. Simpson, J. Willett, S. H. Slocock, T. S. Price, J. W. McIntosh, T. M. Inglis, J. Clarkson, J. W. Brittlebank, W. R. Davis, H. A. MacCormack, F. W. Garnett, Major-Gen. Sir Layton J. Blenkinsop, Professors S. H. Gaiger, G. H. Wooldridge, Mr. G. Thatcher (Solicitor), and Mr. J. B. Buxton (Secretary).

Apologies for absence were received from :—Messrs. R. Hughes, E. H. Stent, F. Hobday, J. S. Lloyd, Hugh Begg, F. L. Gooch, B. De Vine, A. W. Noel Pillers, G. W. Weir, Alex. Munro, J. C. Coleman, F. Willett, W. P. Stableforth.

CORRESPONDENCE.

The Secretary read the following letter from Professor MacQueen :—

May 30th, 1921.

Dear Mr. Buxton,—Herewith I send my subscription for the *Veterinary Record* and National. As I do not seem to be able to attend the meetings, I shall be much obliged by your removing my name from the Council of the N.V.M. Association and the Editorial Committee. You must have a full attendance of the members of both, and as I can be present very seldom, I resign to make way for someone who will attend when required.—Yours faithfully, (signed) J. Macqueen.

Mr. McIntosh moved, seconded by Mr. Price, that the Secretary be requested to write to Professor MacQueen stating that the Council regretted to hear of his resignation, and asking him to reconsider his decision, and hoped he would see his way to continue his membership of the Council. This proposal was carried, and the Secretary was accordingly asked to write Professor Macqueen to this effect.

The Secretary read the following letters from Mr. J. J. Aveston and Mr. W. P. Scott.

June 24th, 1921.

Dear Sir,—I have much pleasure in offering a cordial invitation to the National Veterinary Medical Association of Great Britain and Ireland on behalf of the Royal Counties V.M.A., Southern Counties V.S., Western Counties V.M.A., and Mid-West and South Wales V.A., to hold their annual meeting of 1922 in the city of Bath.

The city of Bath is :—

1. Centrally situated.
2. Has splendid railway services from all parts.
3. Being a winter resort, has ample hotel accommodation in the summer.

4. There are many places of great natural beauty and interest within easy reach of the city to which visits could be arranged, and also in the city itself.

Should the invitation be accepted, you can rest assured that all concerned will do all in their power to make the meeting a memorable one.—Yours very truly, (signed) J. J. AVESTON, *Hon. Sec.*

June 27th, 1921.

My dear Mr. Secretary,—I regret I shall be unable to attend the "National" meeting on Wednesday next. I should like, however, to say on behalf of the M.W. and S.W.V.A. that should the "National" decide to come West next year, it will receive a most hearty welcome from us.

Bath, with all its historical associations, central position, and unique hotel accommodation, lends itself peculiarly for the Association headquarters.

The surrounding country is also attractive, and it is just possible the Duke of Beaufort and the Marquess of Bath might come forward as hosts. A friend of mine, a very generous man, well endowed with this world's goods, might show us hospitality too. Again, there is the exquisite Cathedral of Wells, the historical Glastonbury Abbey, Abbots' Kitchen, etc., etc., not to speak of the rich vale between the Mendips, in which are located the Cheddar Gorge and caves on the one hand, and the Quantocks, the home of the wild red deer, on the other, and between which is the battlefield of Sedgmoor, the scene of the Monmouth rebellion. Linking up this route you would pass through Bridgwater, when it would give my wife and myself great pleasure to entertain the members to tea.

I only just give you this sketch to show you something of the natural possibilities we possess to make the visit a success.—Yours sincerely, (signed) W. M. SCOTT.

The PRESIDENT stated that these letters would have to be read again before the meeting at Chester. In the meantime the Council might consider the invitation.

INSURANCE FEES.

The SECRETARY placed before the Council replies he had received from various Associations *re* Insurance Fees.

The PRESIDENT asked whether it was necessary to take action immediately, as he felt the Council should have time to consider the schedules that had been placed before the meeting. He suggested that copies of proposed fees, and criticisms thereon from various societies, should be circulated to all members of the Council before the next meeting to be held at Chester on July 26th.

Considerable discussion ensued. The President said it was lamentable that so few societies had replied to the letter on this subject sent out by the Secretary.

Professor GAIGER said that there was a feeling in the West of Scotland that fees were inadequate. His society had written to the National many times previously, and, as no action had been taken by that body, his Association had taken action themselves. They were agreed that the minimum should be 10s. 6d., and they had made an effort to get that figure, but Insurance Companies would not pay it pending a decision by the "National." His society was anxious that the matter should be settled at the earliest opportunity.

Professor WOOLDRIDGE said that no correspondence had reached him on this subject from the West of Scotland.

Mr. J. WILLETT remarked that some companies were paying 10s. 6d., irrespective of the value of the animal, and 15s. 6d. for two. He considered that it was much harder to arrive at a definite value of a cheap horse than of a valuable one, but he really thought 10s. 6d. for one horse should be the minimum figure.

The SECRETARY suggested that if the matter was left over until the next meeting of the Council, he would write to the other societies from whom no replies had been received, and get as much information together as possible.

Mr. PRICE moved that this should be done.

It was then decided that the matter should be left over until the next meeting of the Council, but in the meantime the Secretary might circulate all the information he had on the subject to all members of the Council.

The SECRETARY reported that he proposed approaching all the men on the register of the R.C.V.S. who had not joined this Association, asking them to become members. He felt, however, that he could not ask them to pay £2 2s. for half a year's subscription, in view of the fact that he was not in a position to supply back numbers of the *Record*. It would facilitate office work considerably if all subscriptions fell due on January 1st, and he therefore asked that he might be allowed to take in new members at £1 1s. to the end of the year.

Mr. MACCORMACK thought the suggestion a capital one, and he felt new members could not be asked to pay a full year's subscription from July.

It was therefore decided that the Secretary be authorised to accept new members on payment of one guinea for the half-year.

The SECRETARY read the following letter from the Central Veterinary Society:—

June 7th, 1921.

Dear Sir,—At a General Meeting of the Fellows of my Society, held at Woolwich, on Thursday, 2nd June, I was directed to forward for the information of your Council the enclosed copy of a resolution received from the National Clean Milk Society.

This resolution will be fully discussed by my Society at its next General Meeting on July 7th, but it was considered that it should be brought to your Council's notice without delay as, repre-

senting the veterinary profession in the United Kingdom, they would be in the best position to give an authoritative reply to the resolution.—Yours faithfully, (signed) HUGH A. MACCORMACK, *Hon. Sec.*

COPY OF RESOLUTION FROM THE NATIONAL CLEAN MILK SOCIETY.

That in the opinion of the Council of the National Clean Milk Society—

1. Greater care should be taken in the elimination from dairy farms of animals that may be a source of danger to the public through the milk supply.

2. That veterinary surgeons, duly appointed by the Local Authority, should have power to enter the premises of any person producing milk, for the purpose of examining any cattle in the herd, and of reporting on the health of any cattle in the herd.

3. That the Government should take steps to provide for the free use of the tuberculin test by farmers who will adhere to the conditions that the testing authority may lay down.

Considerable discussion resulted from this resolution.

Mr. SIMPSON wanted to know what were the conditions laid down to which reference was made in Clause 3.

The PRESIDENT said he felt sure everyone would agree with the first clause. This was unanimously carried.

With regard to the second clause, Mr. MCINTOSH said he did not approve of this, as he was not altogether in favour of unlimited power being placed into the hands of veterinary surgeons. He thought much more good would be done by co-operating with the farmer and the local veterinary surgeon, and there should be some definite conditions laid down.

Major-Gen. BLENKINSOP considered that during the past veterinary surgeons had been placed too much in the background, and he thought they should have power to enter the premises of any person producing milk, but he thought it would be better to warn the farmer and the usual veterinary surgeon whenever suspicion arose. He did not think that the clause referred solely to tuberculosis.

Mr. GARNETT did not think they were going too far by supporting this clause, or going outside their power. All over the country sanitary inspectors had power to examine any milk of which they were suspicious.

Mr. INGLIS thought it would be better to substitute the clause in the Tuberculosis Order.

Major-Gen. BLENKINSOP said the Tuberculosis Order was no good. How many samples would be taken from animals affected with tuberculosis before a positive diagnosis was made? This was an instance of milk supplied to the public. No one had the right to supply milk to the public which was injurious, and how is it to be ascertained if the milk is fit without inspecting it? He felt unless the veterinary surgeons took their rightful place in this matter, then the National Clean Milk Society, which was a very powerful body, would take action themselves.

Mr. INGLIS said he thought the Tuberculosis Order would be a very suitable one in this respect—that dangerous centres of infection must be eliminated. In Scotland it had done a great deal of good.

Mr. MACINTOSH thought no one should enter premises unless he had suspicions.

Mr. SIMPSON remarked that sanitary inspectors had the right to inspect premises whether they had suspicions or not, and why should not veterinary surgeons? Sanitary inspectors could go without warning and at any time. He felt that veterinary surgeons should have equal power.

Mr. CLARKSON thought that more lay behind the resolution than appeared on the surface.

The PRESIDENT said that they did not seem to be able to gather what Clause 2 would cover, and he was going to make the suggestion that the Secretary should find out more respecting this second clause—what exactly it did cover. This met with the approval of the meeting.

The PRESIDENT said he felt they could have nothing to do with Clause 3.

Mr. GARNETT thought it was probable that tuberculin would be supplied to farmers, but they must not themselves apply the test.

The PRESIDENT thought it would be better if they got more information. As it stood they could not support Clause 3, and were strongly opposed to it.

The PRESIDENT informed the meeting that four Vice-Presidents had to be nominated by the Council for the General Meeting. The present Vice-Presidents were Sir Stewart Stockman, Messrs. William Augustus Taylor, Andrew Watson and Arthur Gofton.

Mr. CLARKSON proposed that these four gentlemen be re-elected, Mr. MCINTOSH seconded. This was agreed to.

The SECRETARY requested that the Council should formally elect new members of the Association to the number of 566. The present membership was 1,036.

Mr. MACCORMACK moved, seconded by Mr. MCINTOSH, that this number be elected. This motion was carried.

The SECRETARY informed the meeting that he had written to all Life Members suggesting that they should retain membership in the Association and should pay one guinea a year for a weekly copy of the *Veterinary Record*, as was proposed at the previous meeting of Council. He had received replies from Mr. G. A. Banham, Major Pallin, Mr. Jackson-Young and General Butler saying that they were quite satisfied with this suggestion.

The SECRETARY asked for permission to increase the salary of Mrs. Gamble, the *Record* clerk, from 35s. to 40s. The necessary permission was given.

The TREASURER :—"At the last meeting a notice was signed and had been forwarded to the Bank with regard to cheques, and there was now some additional formality which he was not aware of—it was to the effect that the account should have been closed, a cheque drawn for the balance, and a new account opened in the name of the new company. If he had done wrong, it was through ignorance. In the meantime he had been drawing cheques under the old rule, and so far as he knew they had been met. He had received a letter from the Bank pointing out they were waiting for instructions with regard to opening this new account."

The SECRETARY reported that he had been in communication with the Belgrave Road branch of the Bank, and they had asked for a letter signed by the Chairman, authorising the closing of the old account and the opening of a new one.

Mr. GARNETT suggested that all cheques drawn on the present account should be cleared, a cheque drawn for the balance, and an account opened in the name of the new Association on July 6th. This proposition was agreed to.

The TREASURER informed the meeting that he had received a further cheque from Mr. De Vine for advertisements, together with a statement giving details of income from advertisements. This made a total income to date from this source of £156, which had been placed to the credit of the Association. This represented monies received during the first six months the Association had taken over the *Record*. In addition to this sum there was due a sum of £120 and another of £100—making the full total for the half-year £376. Many of the contracts would run until the end of the year, so they could regard this sum as half the total for the year, which would be about £750. He felt this was about as much as they hoped to get. As Mr. De Vine said. it was difficult to get advertisements, especially with the present craze for giving the number of circulation. He could not make people realise sometimes that the *Record* had a "special" and not a "general" circulation.

The balance at present standing to the credit of the Association was £940.

GENERAL MEETING.

A General Meeting of the Association was held at 10 Red Lion Square, on Wednesday, June 29th, 1921.

The President, Dr. O. Charnock Bradley, occupied the chair, and the following members signed the attendance book :—Messrs. H. L. Roberts, F. G. Samson, P. W. Dayer-Smith, H. R. Allen, P. J. Simpson, J. Willett, G. H. Livesey, S. H. Slocock T. S. Price, J. W. McIntosh, S. H. Gaiger, T. M. Inglis, J. Clarkson, W. R. Davis, H. A. MacCormack, A. W. Mason, F. W. Garnett, W. S. King, H. S. Mosley, J. H. Carter, Col. J. W. Brittlebank, Maj r-Gen. Sir Layton J. Blenkinsop, Professor G. H. Wooldridge, Mr. G. Thatcher (Solicitor), and Mr. J. B. Buxton (Secretary).

Apologies for absence were received from :—Messrs. R. Hughes, E. H. Stent, F. Hobday, J. S. Lloyd, Hugh Begg, F. L. Gooch, B. De Vine, A. W. Noel Pillers, G. W. Weir, A. Munro, Hamilton Kirk, D. S. Prentice, J. Ewing Johnston, C. W. Townsend, E. R. Edwards, G. R. Dudgeon, W. L. Little, F. Willett, W. P. Stapleforth.

The PRESIDENT remarked that there were no minutes to read—those of the previous meeting would be read at the Annual Meeting to be held at Chester in July.

There was no correspondence.

The PRESIDENT said members were probably aware that this meeting was very formal, and was called to comply with legal requirements. We must, according to the law, have a meeting not sooner than one month and not more than three months after the signing of the Articles of Association. This complies with those requirements. At the same time certain business must be done. At this meeting we have to elect officers.

The SECRETARY then formally made the following announcement as to office holders.

President :—Dr. O. Charnock Bradley (proposer Mr. Garnett, seconder Major-Gen. Sir Layton J. Blenkinsop).

Vice-Presidents :—Sir Stewa rt Stockman, Messrs. William Augustus Taylor, Andrew Watson and Arthur Gofton (proposer Mr. Brittlebank, seconder Mr. McIntosh).

Treasurer :—Mr. George Henry Wooldridge (proposer Mr. Clarkson, seconder Mr. MacCormack).

General Secretary :—Mr. James Basil Buxton (proposer Mr. Mason, seconder Mr. Clarkson).

Members of Council :— Orlando Charnock Bradley, Esq. (President) ; Sir Stewart Stockman and Messrs. William Augustus Taylor, Andrew Watson and Arthur Gofton (Vice-Presidents) ; Professor George Henry Wooldridge (Honorary Treasurer) ; Mr. James Basil Buxton (General Secretary) ; Messrs. William Augustus Taylor and Frederick George Edwards (Chairman and Local Secretary of the Provisional Committee) ; Messrs. W. Ackroyd, J. T. Angwin, Charles Allen, W. M. Ascott, O.B.E., T. E. Barcham, G. E. Bowman, W. T. D. Broad, Col. J. W. Brittlebank, C.M.G., Messrs. W. H. Brooke, J. Clarkson, Professor J. F. Craig, M.A., Messrs. W. R. Davis, H. J. Dawes, P. Deighton, E. L. Dixson, W. B. De Vine, F. W. Garnett, C.B.E., F. C. Gillard, F. L. Gooch, D. Hamilton, W. A. Hancock, T. Hicks, H. P. Hogben, A. C. Holl, G. Howie, R. Hughes, T. T. Jack, R. Jones, W. W. Lang, Professor R. G. Linton, Messrs. G. H. Livesey, J. S. Lloyd, L. W. Wynn Lloyd, G. H. Locke, Professor J. R. McCall, Mr. H. A. MacCormack, Messrs. J. W. McIntosh, J. F. MacIntyre, Professor J.

Macqueen, Messrs. G. P. Male, W. Marshall, Col. A. W. Mason, Messrs. A. J. Moffett, Alex. Monro, Professor J. J. O'Connor, R. R. H. Over, A. W. Noel Pillers, T. S. Price, W. Roach, M. Robinson, F. G. Samson, F. H. Sanderson, J. Simpson, S. H. Slocock, W. Smyth, J. Spruell, D.V.S.M., W. P. Stableforth, J. M. Walker, J. Willett, H. Williams, E. C. Winter, W. Woods, J. H. Wright (proposer Col. Brittlebank, seconder Major-Gen. Sir Layton J. Blenkinsop).

Auditors:—Professor Macqueen and Mr. A. E. Wykes (Professional Accountant). (Proposer Mr. Mason, seconder Mr. Simpson.)

Provisional Committee:—Messrs. T. S. Atkinson, H. Race, T. Eaton Jones, Henry Sumner, senr., E. H. Stent, A. Lawson, F. G. Edwards, J. Gregg, T. McGuinness, D. S. Prentice, Professor J. T. Share-Jones, Messrs. S. E. Sampson, H. G. Bowes, J. McKinna, T. A. Dobie, A. B. Mattinson, Professor Gaiger, Messrs. A. Edgar, J. Lindsay, T. McGhee, C. Mayall, J. B. Wolstenholme, Stafford Jackson, and J. H. Norris (proposer Mr. Clarkson, seconder Mr. Price).

Col. Brittlebank proposed and Mr. Clarkson seconded that the Annual General Meeting be held at Chester. Carried.

A vote of thanks to the Chairman closed the meeting.

Notes and News.

Foot-and-Mouth Restrictions Withdrawn.

Orders have been made by the Ministry of Agriculture withdrawing all remaining restrictions which were imposed on the movement and marketing of animals in consequence of the recent outbreaks of foot-and-mouth disease in the North Midlands and in Yorkshire. No outbreak of the disease has occurred in any part of Great Britain during the past four weeks.

An order has also been made withdrawing as from July 6th all special restrictions which were imposed on the importation of Irish animals on account of outbreaks of foot-and-mouth disease in Ireland. On and after July 6th Irish animals may be landed in Great Britain subject only to the normal condition of ten hours' detention in the landing place, at the expiration of which they will be free, so far as the Ministry's orders are concerned, to be moved to any part of the country without further restriction.

The Argentine sanitary authorities have now made a favourable report on the question of allowing the importation of cattle from Great Britain, which has been prohibited for some time past.

The Cattle Commission Report.—Mr. James Wilson asked the Prime Minister when the report of the Royal Commission on the Importation of Live Stock may be expected; and whether it would be in time to be laid before the Imperial Conference.

The Prime Minister: The Commission is at present still taking evidence, and owing to the bulk of that evidence its consideration will take some time. I am informed, however, that the Commissioners hope that they may be able to present their report in August. I am not at present in a position to reply to the last part of the question.

Mr. Ewing Johnston, M.B.E., M.R.C.V.S., May Street, Belfast, has received the following letter from Sir Charles Fitzwilliam, Crown Equerry to the King:—"I beg to express many thanks for the excellent arrangements made for the accommodation of his Majesty's servants and horses in connection with the Royal visit to Belfast, and to say that all you have done is much appreciated." Mr. Johnston has also received a letter of appreciation from Sir Neville Wilkinson, Ulster King-of-Arms. The horses for the Ulster King-of-Arms and the Cork and Dublin Heralds were supplied by Mr. Johnston.

Meat Inspectorship Examination.

At an examination for Meat Inspectors held in Leeds on July 1st and 2nd, 1921, twenty-seven candidates presented themselves.

The following sixteen candidates were awarded certificates:—Barrett, Alfred Ernest, Leeds; Beever, Samuel, Idle; Cooper, Joseph, Holbeck; Elliott, Harold Arthur, Ripon; Foster, George, Leeds; Gallagher, Joseph, Scunthorpe; Givens, Willie, Leeds; Humphrey, James Smith, Leeds; Jenkins, James, Ryton; McAllister, William Pringle, S. Kirkby; McMorine, John Bell, Dumfries; Mears, William Anthony, Sunderland; Rhodes, Samuel, Leeds; Riley, William, Keighley; Stringfellow, Fred, Consett; Veit, Peter, Leeds.—E. WHITE WALLIS, *Deputy Registrar.*

Liverpool Veterinary Science Examination.

DEGREE OF BACHELOR OF VETERINARY SCIENCE.

FINAL EXAMINATION.—*Part* 1, T. Hare. *Part* 2, H. V. Hughes.

THIRD EXAMINATION.—*Parts* 1, 2, 3, A. M. Fulton (with distinction in Bacteriology), H. Thornton, and J. W. Thwaite.

SECOND EXAMINATION.—*Part* 1, G. O. Davies, K. D. Downham, A. W. Holtum (with distinction in Veterinary Anatomy), Edith G. Knight, and E. L. Taylor.

FIRST EXAMINATION.—*Part* 1, N. Woolley. *Part* 2, J. Birtwistle and G. M. Griffith.

EDWARD CAREY, *Registrar*

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Correspondence.

Letters to the Editors should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue

"Fleeting Tetanus" in a Mare.

Sirs,—The report of the Irish Veterinarian on page 360 of your Journal for May 7th, 1921, on "Fleeting Tetanus in a Mare," has been of especial interest, as the description given is somewhat typical of cases which came under my observation several years ago while engaged in practice in the great breeding section of the State of Illinois. Efforts to determine the cause of these cases observed in mares which were nursing colts were futile. The symptoms of tetanus came on suddenly and disappeared in like manner, without the administration of drugs. There was always a mystery concerning these cases, both as regards their etiology and pathogeny.

In later years, upon reading works upon medicine, a striking similarity was noted between this condition affecting mares and that described in human medicine as tetanus intermittens. There appears to be a dearth of information in veterinary literature concerning this disease, although in Hutyra and Marek's work on Pathology and Therapeutics of the Diseases of Domestic Animals there is a reference to such condition under the general heading of Tetany.

In his work, Modern Medicine, Osler treats very fully upon tetanies in the human subject, among which are those of pregnancy, parturition and nursing. Whether or not these various tetanies have a common etiological factor has not been determined. The belief has been expressed, however, that in these cases a disturbed calcium metabolism of the body leads to a hyperactivation of the neuromuscular responses which results in the tetany spasms. Experiments tend to prove that there is an important relation of calcium salts to the excitability of nervous tissues, their withdrawal leaving the nerve cells in a condition of hyperexcitability which disappears upon administering a solution of calcium salt. Among the symptoms of this affection in the human patient, as described by Dr. Osler are anomalies of circulation with œdema and disturbances of respiration with cyanosis, and it would appear somewhat similar conditions as observed in certain cases of nursing mares.

If, as might appear possible, the cause of this condition is due to absence of calcium in the system as a result of nursing, or of disturbed metabolism, the use of lime water and of foodstuffs rich in calcium would seem to be indicated as preventive measures and in treatment of affected animals, administration of calcium salts by orem, if possible, or if such method is not feasible owing to tetanic masseter muscles, by means of intestinal enemata.—Very respectfully, G. W. P.

1340 Meridan Place, N.W., Washington, D.C., *June* 27th, 1921.

Students' Vacation Practice.

Sirs,—As one of many students eager to see practical work during the vacations, I trust you will give space to this letter. As this branch is absolutely essential in addition to the theoretical, we are naturally anxious to see as much as possible. I, like many others, am an ex-soldier, who, through five years' absence, am out of touch with any particular locality. I have written to many veterinary surgeons, and have nearly always met with the response that, as I have seen no practice already, I am no use to them, or, worse still, have received no reply at all. This, mark you, in spite of the fact that I am perfectly willing to pay my own board and do any job to help, though I cannot afford to pay a premium. Surely veterinary surgeons can help at least those who are ex-service students, and, in addition, further the interests of the profession, by some practical assistance in this matter. Trusting my appeal will not fall on deaf ears.—Yours, etc., J. L. STEWART, Royal (Dick) Veterinary College, Edinburgh, *July* 8th, 1921.

Army Veterinary Service.

LONDON GAZETTE, WAR OFFICE, REGULAR FORCES.

July 7th.—Major-Gen. E. R. C. Butler, C.B., C.M.G., F.R.C.V.S., is placed on retired pay (July 3rd).

Diseases of Animals Acts, 1894 to 1914. Summary of Returns.

Period.	Rabies. Cases Confirmed. Dogs.	Rabies. Cases Confirmed. Other Animals.	Anthrax. Outbreaks confirmed.	Anthrax. Animals attacked.	Foot-and-Mouth Disease. Outbreaks confirmed.	Foot-and-Mouth Disease. Animals slaughtered as diseased or exposed to infection.	Glanders (including Farcy).* Outbreaks reported by the Local Authorities.	Glanders (including Farcy).* Animals attacked.	Parasitic Mange. Outbreaks reported by the Local Authorities.	Parasitic Mange. Animals attacked.	Sheep Scab. Outbreaks reported by the Local Authorities.	Swine Fever. Outbreaks confirmed.	Swine Fever. Swine slaughtered as diseased or exposed to infection
GT. BRITAIN.	No.	No.	No.	No.	No	No.	No.	No	No.	No.	No.	No.	No.
Week ended 2nd July, 1921 ...	...	...	5	7	...	...	1	3	32	38	7	29	10
Corresponding Week in 1920		...	5	5	3	684	...	..	47	82	...	38	15
Corresponding Week in 1919	3	...	1	5	...	...	...	...	94	172	1	81	28
Corresponding Week in 1918	...	...	4	4	...	...	2	2	49	124	1	51	30
Total for 27 weeks, 1921 ...	21	1	297	360	41	2888	6	11	156	2439	395	724	224
Corresponding period in 1920	4	...	231	271	65	8086	10	17	2735	4667	285	1219	472
Corresponding period in 1919	115	3	101	137	19	1033	14	4	3556	6924	214	1095	473
Corresponding period in 1918	...	...	147	165	...	...	21	57	3039	5827	245	770	290

NOTE. The figures for the current year are approximate only. *Excluding outbreaks in Army horses.

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